Experimentation & Demonstration Supporting Acquisition

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PEO C4I and Space

FORCEnet Engineering Conference

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Agenda

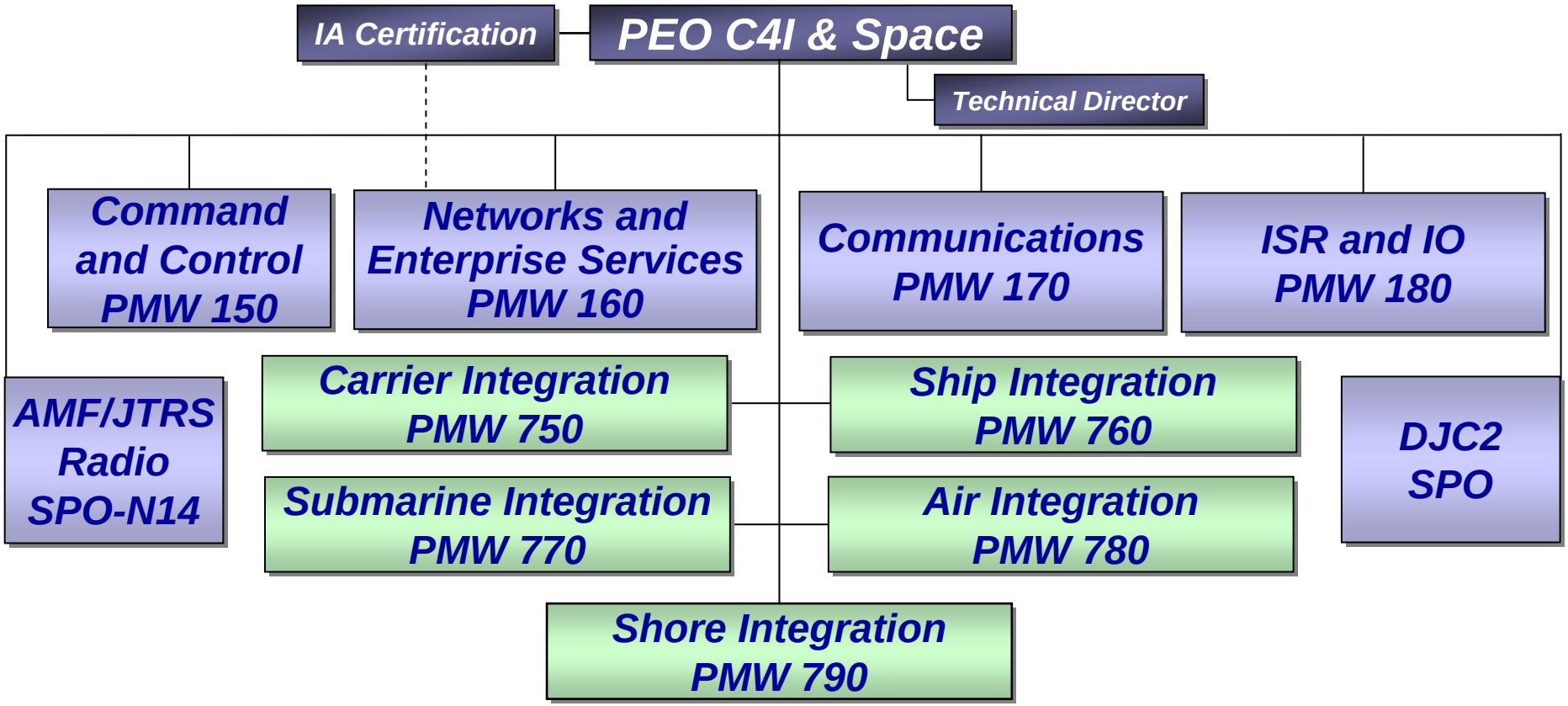
- PEO C4I & Space
  - Organization and Responsibilities
  - Science & Technology Engagements
- Science & Technology Insertion
  - NCW Roadmap
  - Netcentric Enterprise Solutions for Interoperability (NESI)
- Leveraging Experimentation to Support Acquisition
  - Successes
  - Emerging Capabilities
  - Challenges
- Focus Areas for PEO C4I & Space
  - Technology Gaps
  - Way Ahead

PEO C4I & Space Mission

***Mission**: Acquire, Integrate, Deliver, and Support Interoperable C4I & Space Capabilities Enabling Seamless Operations for Fleet, Joint, and Coalition Warfighters*

- ***Responsible for Acquiring and Sustaining Navy C4I Capability***
  - ***"Cradle-to-Grave"***
- ***Report Directly to Service Acquisition Executive***
- ***Oversight of 118 C4I Programs/Products***
- ***Budget Authority of ~ $2.0B***
- ***Streamlined Staff/Disciplined Execution***
- ***Transforming Acquisition***

PEO C4I and Space
Organizational Structure



Functional PMs responsible for product development and sustainment.

Platform PMs are responsible for Integration to the platforms, primary fleet POCs, installation, and accelerated delivery of the C4I capabilities to platforms (through platform sponsors and new ship construction).

PEO C4I S&T Engagements

- S&T Transition
  - Office of Naval Research (ONR)
    - Future Navy Capabilities (6.3)
    - Rapid Technology Transition (6.4)
  - Small Business Innovative Research (SBIR)
    - Phase 1 ⇒ Phase 3 Transition
  - DARPA

- S&T Experiments
  - Sea Trial (6.3/6.4) Experimentation Opportunities
    - Trident Warriors, Coalition Warrior Interoperability Demonstration (CWID), Limited Objective Experiments (TW Risk Reduction, JRAE), Limited Technology Experiments
  - Advanced Concept Technology Demonstrations (ACTD)

Partner with PMWs and Experimentation/Demonstrations to achieve goals

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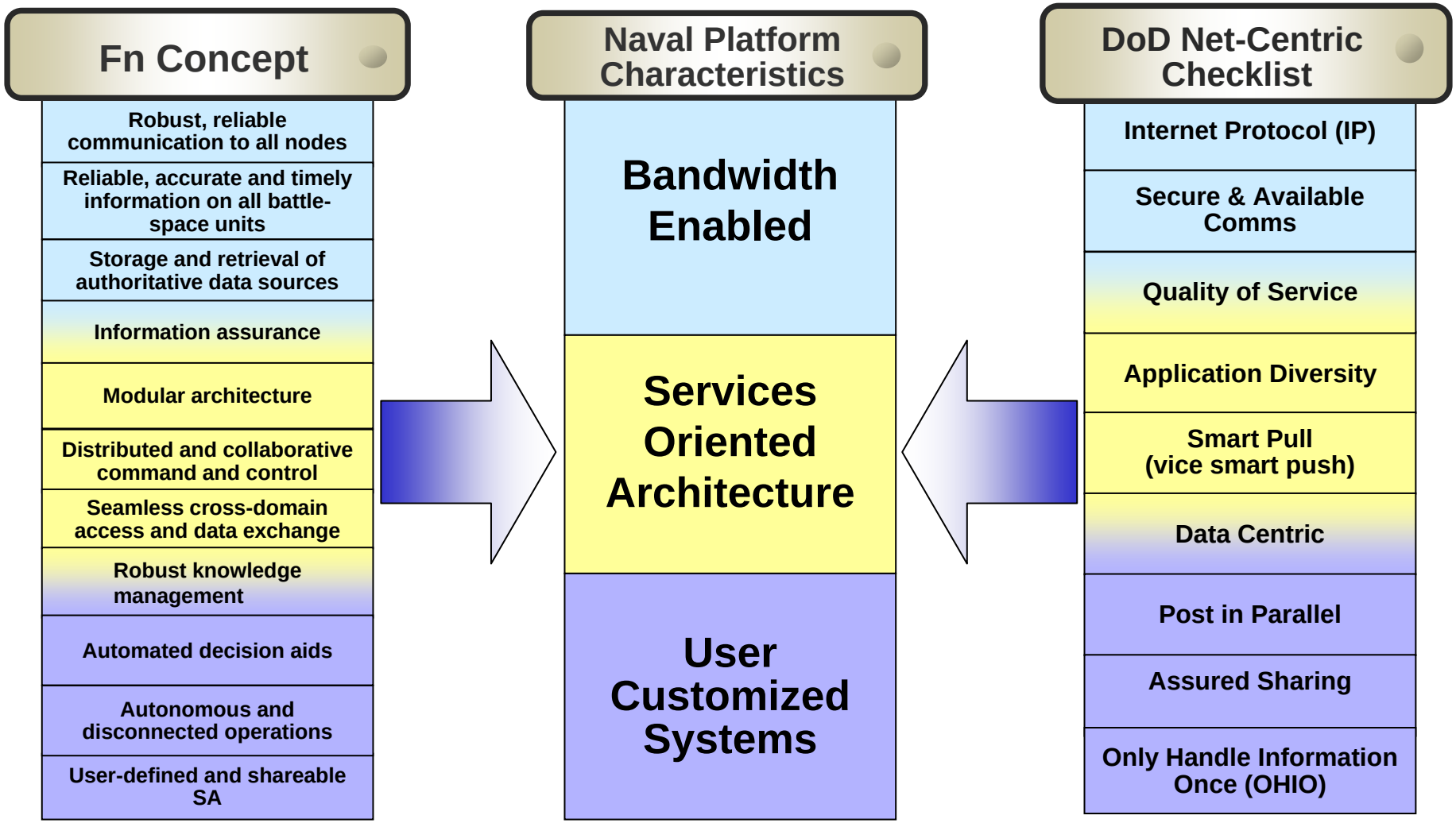
NCW Roadmap Overview

Alignment

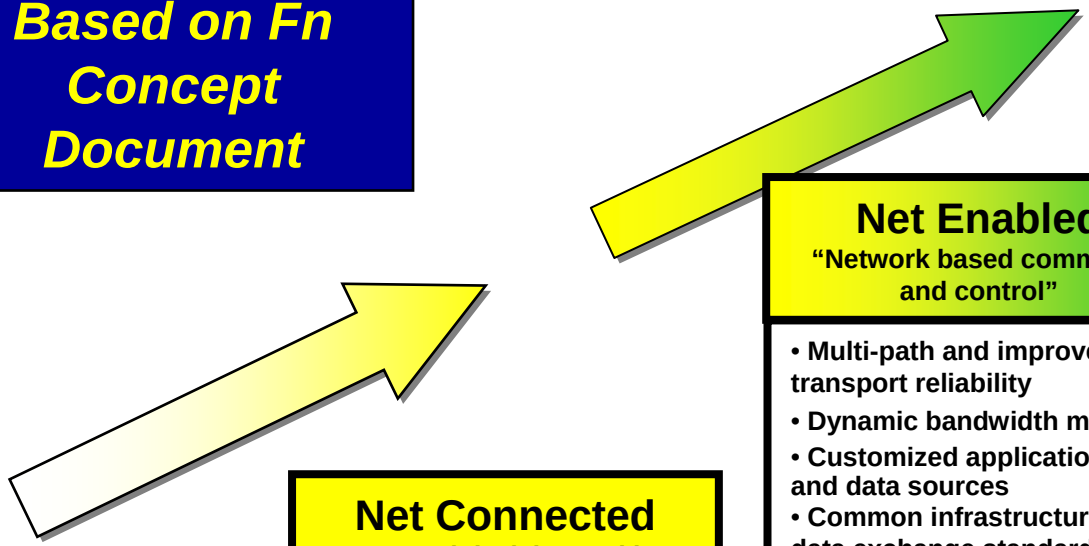
- Defines NCW Capability levels for ships, subs, aircraft, and shore nodes
  - Requires Fleet and OPNAV endorsement of NCW Levels for platforms
- Charts levels by platform across FYDP
  - Bandwidth enabled
  - Services Oriented Architecture
  - User Customized Systems
- Synchronizes Requirements with Resources to deliver Capabilities
  - Slow down some, speed up others
  - Reduce budget for some, increase budget for others
- Provides rationale basis for SHIPMAIN decisions
  - Enable capability based “voting”

Naval Platform NCW Characteristics



Capability Stepping Stones to FORCEnet

Based on Fn Concept Document



Full IT21
"Online"

- IP Reach Back
- Local Area Networks
- Wideband Receive
- RF Management
- Survivable comms

Level 0

Today

Net Connected
"Improved decision making"

- Web-based services
- Improved network reliability and performance
- Increased bandwidth
- Improved coalition operations and data sharing
- Tailorable situational awareness tools
- Standardized data exchange between domains
- Defense in depth

Level 1

FY07

Net Enabled
"Network based command and control"

- Multi-path and improved transport reliability
- Dynamic bandwidth mgmt
- Customized applications and data sources
- Common infrastructure and data exchange standards
- Improved data exchange across domains
- Enterprise management for asset analysis and repair
- Initial knowledge management and automated decision aids
- Assured sharing
- Distributed command and control operations
- Modular and open architecture

Level 2

FY10

Fully Net Ready
"Decision-making under undesirable conditions"

- Robust, reliable communication to all nodes
- Reliable, accurate and timely information on friendly, environmental, neutral and hostile units
- Storage and retrieval of authoritative data sources
- Robust knowledge management capability with direct access ability to raw data
- User-defined and shareable SA
- Distributed and collaborative command and control
- Automated decision aids to enhance decision making
- Information assurance
- Seamless cross-domain access and data exchange.
- Interoperability across all domains and agencies
- Autonomous and disconnected operations
- Automatic and adaptive diagnostic and repair
- Modular architecture to expedite new capabilities

Level 3

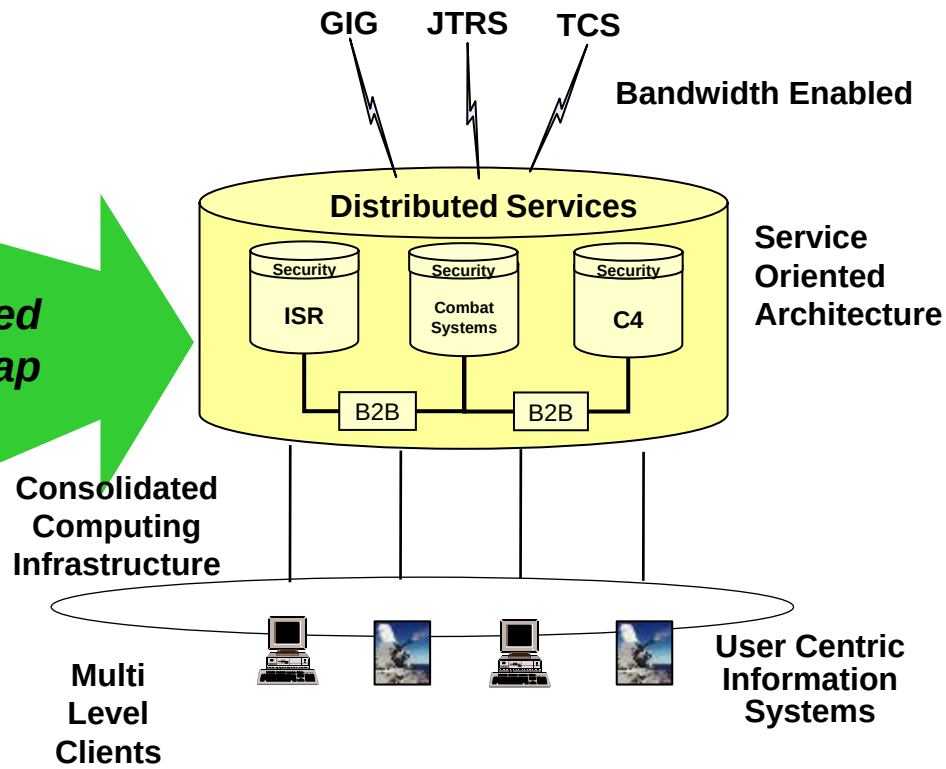
FY14

NCW/FORCEnet

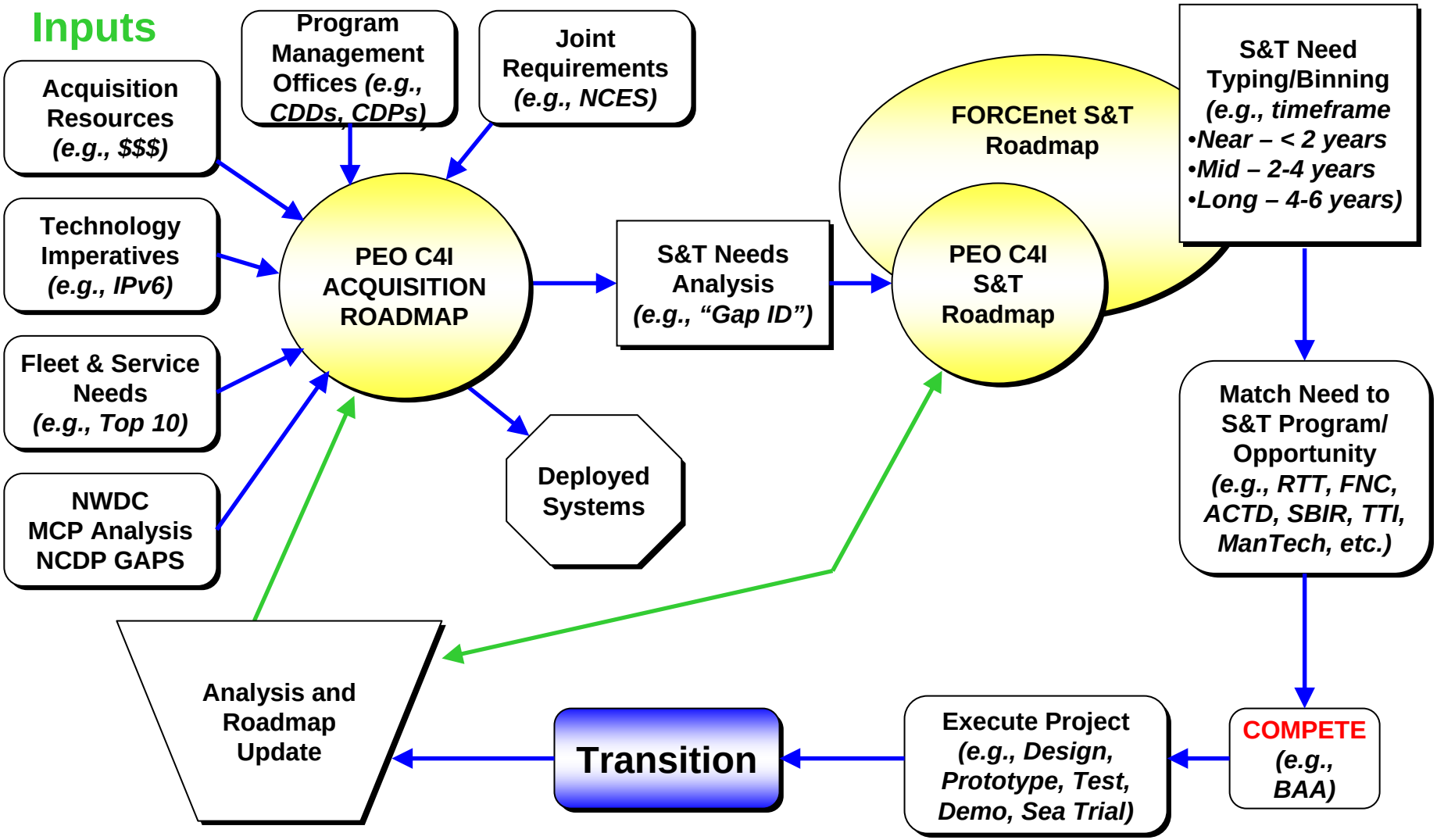
Objectives

- Remove Bandwidth as a Capability Limit
- Multi-path Transport & Redundant Paths
- Capability on Demand
- Distributed Operations
- Customized Applications
- Multi-User Access
- Customized Delivery
- Assured Sharing
- Information Provided to Operator is Relevant, Timely, Accurate, and Usable

Integrated Roadmap



PEO Acquisition/S&T Roadmap
"Circle Of Life"



Net-centric Enterprise Solutions for Interoperability (NESI)

- Working harmonization with OA and FORCEnet
- Provides implementation guidance to facilitate the design, development and usage of information systems for net-centric warfare
- Cross-Service effort between Air Force (ESC) and Navy (PEO C4I & Space)
  - Army & DISA participated informally
- Actionable guidance that **SHALL** be followed by all PEO C4I products to include S&T transitions
- A community policy that can adapt to changing standards or disruptive technologies

For more information: http://nesipublic.spawar.navy.mil/

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Recent Successes

- Coalition Warrior Interoperability Demonstration (CWID)
  - Expand Accelerator (also in TW05 as p/o BOS RTT)
- Trident Warrior
  - Intra-Battle Group Wireless Network (IBGWN)
  - EHF TIP
  - ADNS II
  - Bandwidth Managed Voice (BMV)/QoS
- Joint Rapid Architecture Experimentation (JRAE)
  - Blue Force SA (Spiral for TW $\Rightarrow$ GCCS v4.x)
  - Target List Management (interface JTT, ADOCS, TBMCS, etc)
    - Cursor on Target

Recent Success

FNC: Demonstrated in Trident Warrior 03

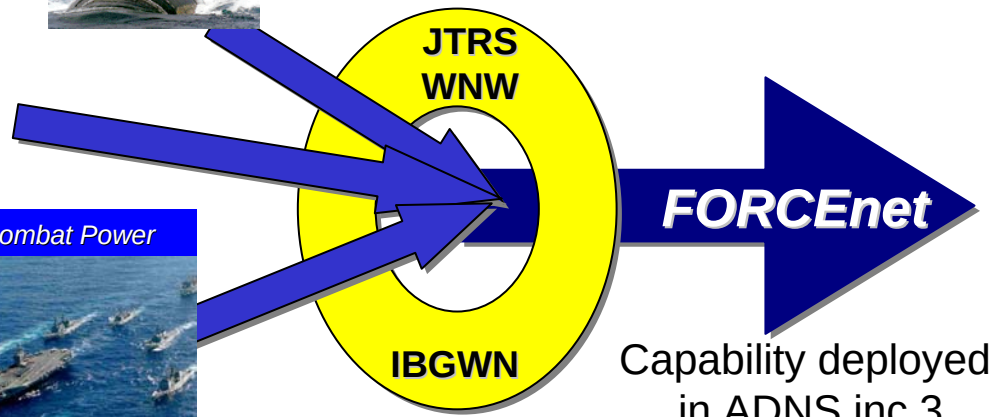
- Intra-Battle Group Wireless Network (IBGWN)
  - Integrated JTRS WNW surrogate capability for Navy air, surface, and subsurface combat power domains
  - Web-based distributed tactical network management tool
  - Persistant bandwidth efficient collaboration application - Uber Chat

SubSurface Combat Power

-Organic wideband tactical link for CSG/ESG comms.
-Requires JTRS WNW alternate modes: LPI/D, Receive-only, Asymmetric.

Air Combat Power

-Airborne JTRS WNW surrogate capability
-Airborne SIPRNET Access
-Integrated with Navy's Airborne ADNS POR.



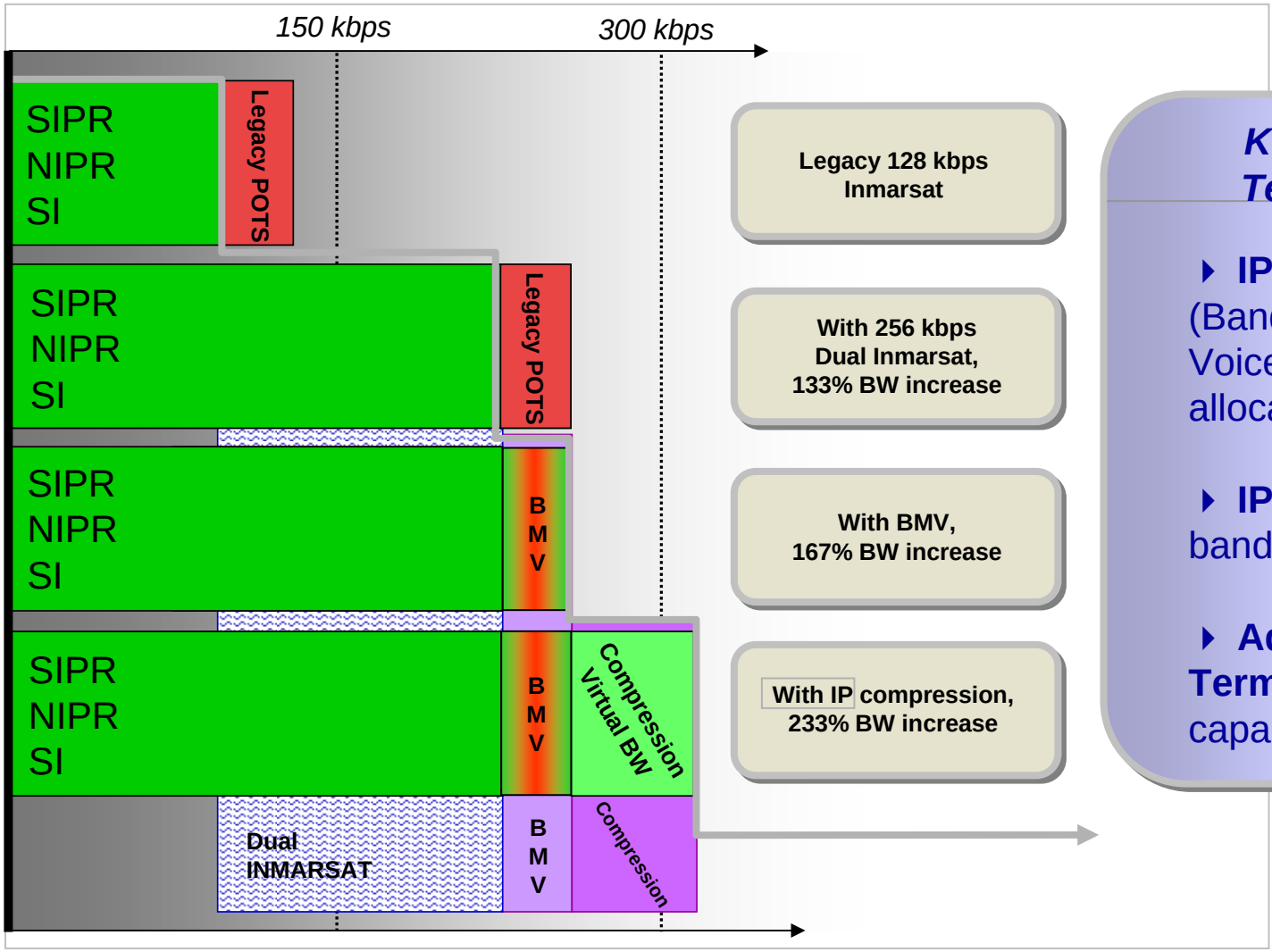
-Increases network availability to all battle group platforms.
-Organic high capacity adaptive comms for CSG/ESG.
-Infrastructure independent.
-Provides alternate wideband link to disadvantaged platforms
-Reduces burden on existing SATCOM.

Surface Combat Power

Capability deployed in ADNS inc.3

Recent Success

Increased BW: Demonstrated in Trident Warrior 04



Key Enabling Technologies:

- **IP convergence** (Bandwidth Managed Voice) for dynamic allocation
- **IP compression** for bandwidth optimization
- **Additional Terminal** for additional capacity

Percent increase of BW available for data, compared to Legacy 128 kbps INMARSAT

Emerging Capabilities Focus

- Future Naval Capabilities (FNCs)
  - Integrated Autonomous Network Management (IANM)
  - Extensible Tactical Common Framework (XTCF)
  - Dynamic Link-16 Management
- Rapid Technology Transition (RTT)
  - BW Optimization (BOS)/Expand Accelerator
  - Airborne ADNS
  - E2C HF SIPRNET
  - Multilevel Security Coalition Architecture (MLS CA)
- Small Business Innovative Research (SBIR)
  - Anti-Terror Threat Detection System: COMINT to support MIUWS
  - Smart Signal Parser/Actionable Intelligence Extractor: SIGINT
  - Navy Intelligent Agent Security Monitor for R&D of Offensive Actions: Defend against Computer Intrusion
  - PMW180 Coordinated Series of SBIR Phase II efforts: Anti-Terrorism

Emerging Capabilities
SBIR

Anti-Terrorism Technologies For Asymmetric Naval Warfare (Navy SBIR Topic N02-107/1)

- Special Topic Solicitation that coordinates a key technologies that together provide transformational warfighting capabilities
- Goal: Conduct a real world demonstration of seamless multi-INT sensors and processing capabilities, coordinated via a common C3 architecture that provides timely Indications and Warning (I&W), combat ID, and targeting quality data
  - Integrated use of both national and tactical assets
  - Fully networked sensors (Sensor.IP)
  - Advanced human-computer interaction, including remote operations, for manpower reduction
- Sponsors: PEO-C4I SBIR and PMW-180
  - Responsible for development and fielding of Navy cryptologic systems

Process Challenges

- Alignment
  - Establish common prioritized technology (capability) focus areas for DON enterprise
    - Mapping between: NCDP/MCP, Fleet “Top 10”, NDWC
  - Apply prioritized focus areas to SeaPower21 Pillar (Strike, Shield, Basing, Enterprise) Roadmaps
  - Ensure POM is aligned to resource deployment of approved technology gap projects

- Budgeting Process vs Information Technology Half Life’s
  - Change rate of IT technologies/capabilities essentially guarantees loss of synchronization with PPBS
  - Asynchronous/Emergent Requirements (eg. Disruptive Technologies)

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Technology Gaps

- **Multi-Level Security**
  - Sharing across enclaves
  - Sharing information with Coalition Partners
- **Information Assurance**
  - Data (in-transit, at rest and while under manipulation)
  - Coalition (Access controls for individuals and network resources)
- **COMMS & Networks**
  - Bandwidth/Spectrum/Network Management
  - E2E QoS
  - **Mobile Ad-hoc Networks (MANet)**
    - Wireless Quality of Service
    - Self Forming Network Mgmt (Cross Service/Platform)
- **C2**
  - Dynamic Software Composability
  - Seamless Data Sharing
  - SOA for Tactical Environments e.g. BSN
- **Global War on Terrorism (GWoT)**
- **Maritime Domain Awareness (MDA)**

Way Ahead

- POM 08 Objectives
  - Define NCW levels for platform groupings
    - Establish MOE/MOP for associated capabilities
  - Develop model capable of evaluating NCW capabilities
  - Leverage output of NCW models to identify capability and technology gaps
- C4I Roadmap
  - Community tool being developed to enable capabilities based acquisition
  - Establish S&T tracking and analysis tool to capture technology gaps and track proposed and current S&T projects.
  - Align with ONR S&T Roadmap

Summary

- Sea Trials Provide a Valuable Resource to Acquisition
  - Provide risk reduction
  - Support operational testing and feedback
  - Support product development spirals
  - Alignment of experiment focus areas to NCDP assessments required 1 year out to enable metrics feedback into NCDP Modeling & Simulation
- S&T Investment
  - Sea Trials support S&T investment/disinvestment policies
  - Normalized Roadmap Alignment across prioritized capabilities

EL4 Source Document Implementation/Metrics - Packaging, consolidation -- Implementation responsibility maintained within each functional Manager/Div. Div
Eric Lester, 12/13/2004

EL5 rename to better reflect efforts
Eric Lester, 12/13/2004

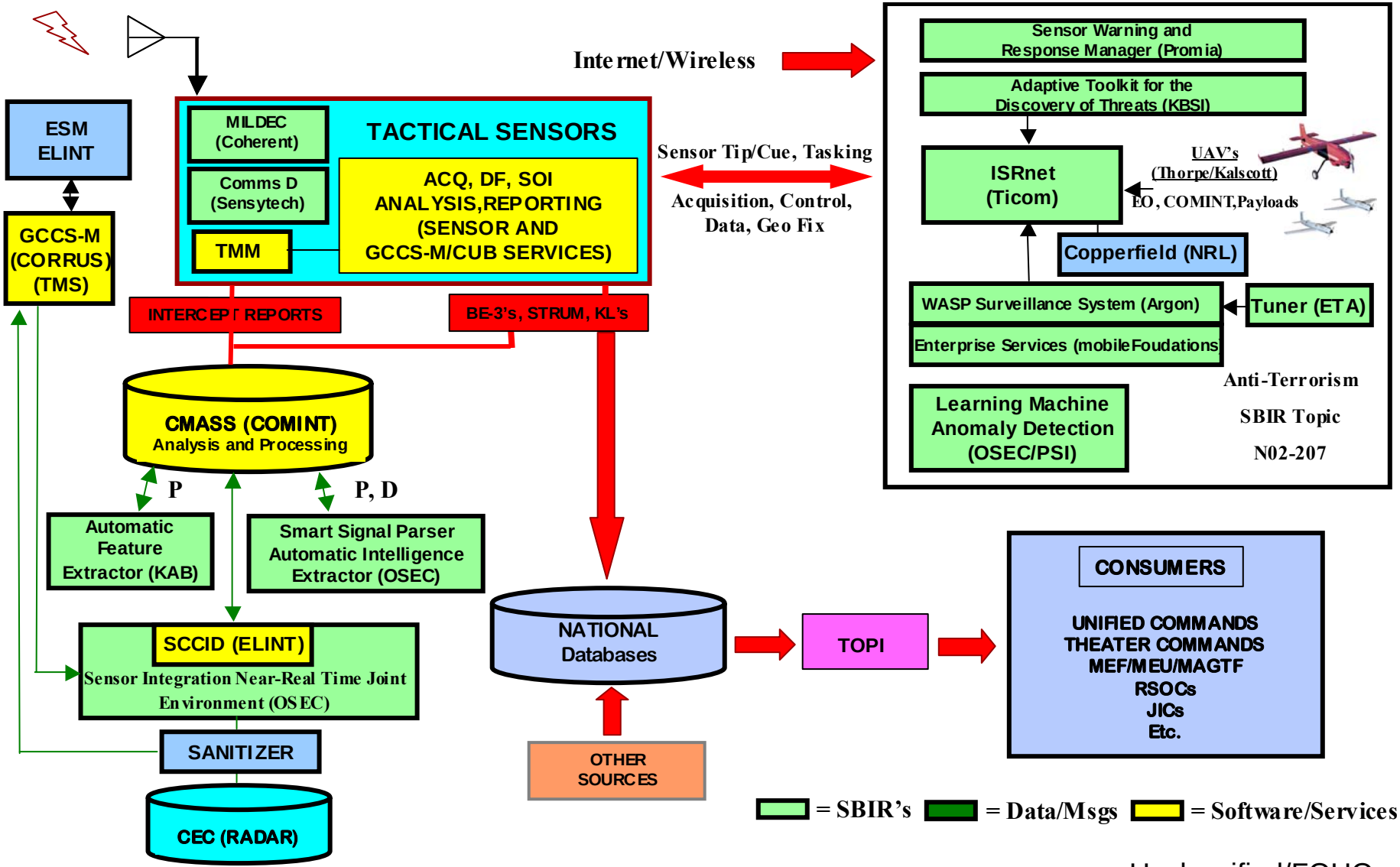
Backups

NCW Level Components

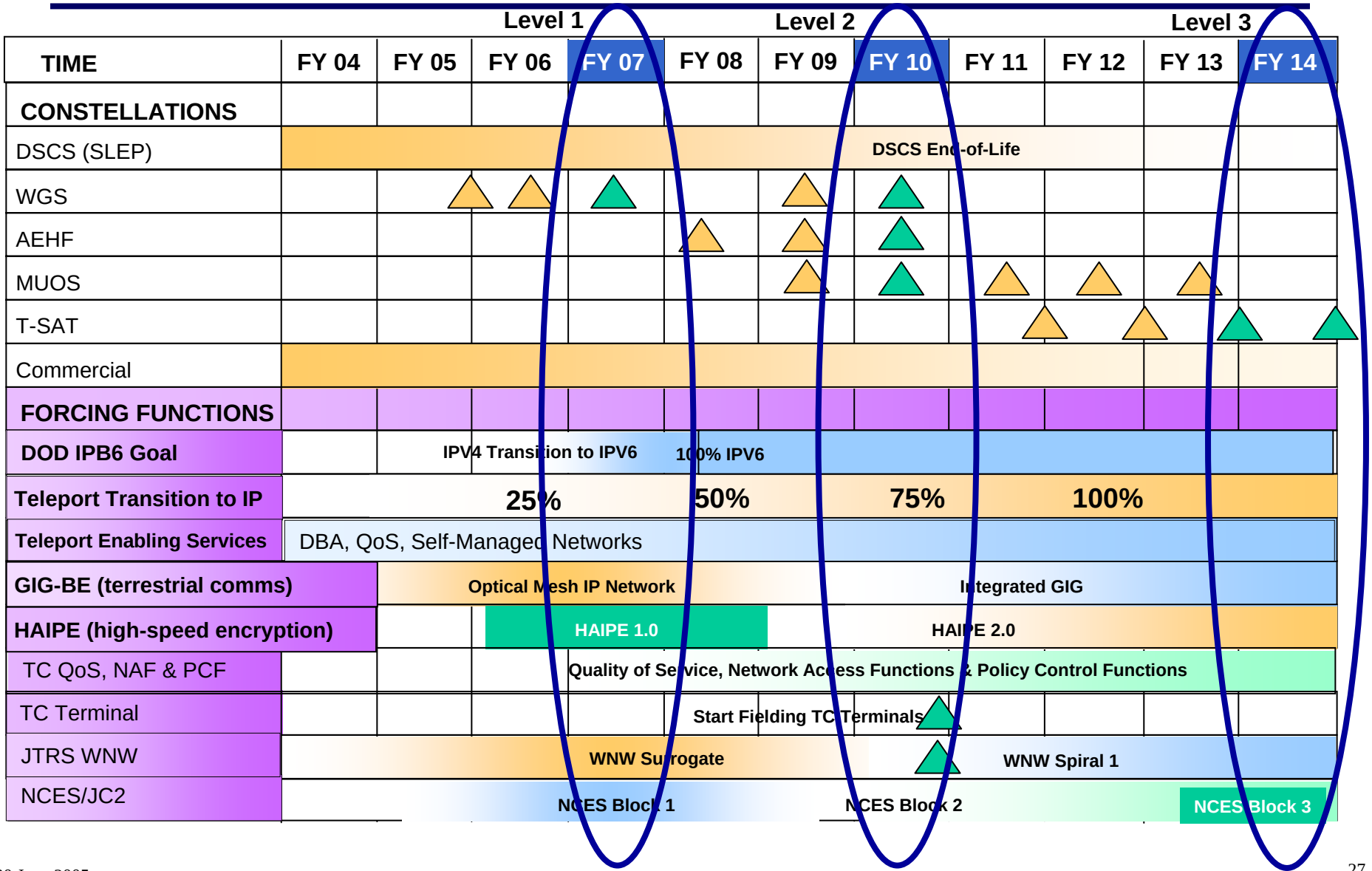
	Platform	Level 0 Basic Network Connection	Level 1 Higher Bandwidth & Improved Network Infrastructure	Level 2 NCW Enabled	Level 3 Fully NCW Ready
Bandwidth Enabled	Ships Subs Shore	IP capable, Link 11, Link 16, MIDS-LVT (LOS Only), DWTS, CWSP, EHF MDR, DSCS, INE	INMARSAT upgrades (2X BW), GBS IP migration, EHF TIP, X/C-Band for DDGs, ADNS Incr 2 (IP Static QoS Mechanism, Traffic Mgmt Mechanism & Application Prioritization, WGS BW Bottleneck), ISNS Incr 1 (Traffic Shaping/IP compression), Link 22, Dynamic Data Link Network Management, CSRR, Sub HDR antenna, High Speed Global Ring (HSGR), SSGN, VA SHF, Sub cutover to IP, BLOS Tactical Data Exchange, VoIP Incr 1, HAIPE	IPv6, NMT (4X Protected BW (2 Mbps)), WGS w/ EBEM modem (10X BW (15 Mbps)), MUOS (64 Kbps to small term), JTRS, WNW, Tactical Networking Waveform, Video over IP, CDL Spiral 1, Sub COMMS at Speed/Depth, Sub SHF (FOT, Sub X-Band Turbocodic modem), WGS Ka, ADNS Incr 3 (Black Core Routing), Satellite Dynamic Bandwidth Allocation, Sub HDR antenna, VoIP Incr 2	TSAT w/ TC terminal (17-45 Mbps protected), Advanced HDR antenna, TCDL/Ku-band in the OE-538, VoIP Incr 3, IXS Cutover/Assured IP
	Aircraft	Legacy, MIDS-LVT (LOS Only), Link 11	Link 16, Link 22	MIDS JTR, WNW (TTNT-Like), Tactical Networking Waveform, Weapons Data Link	TSAT w/ TC terminal (17-45 Mbps protected), IXS Cutover
Services Oriented Architecture	Ships Subs Shore	Sharing of data via translators (Link 16 data to CCS via translators), IP Capable via LAN, Link 11, MIDS-LVT (LOS Only) Link 16 data integrated into Combat (exception of 10 CVs, CGs), Serial Crypto, INE, CENTRIXS, GPS Receivers(NAVSSI)	GCCS 4x (web enabled services). ISNS Incr 1 (ruggedized redundant network, GIG-E), SSEE incr E, NGC2P, Link 22, COMPOSE 2&3, Sub-LAN (Incr 1&2), CDL-N, SCI Networks incr 2, Enterprise Management Spiral 1, CENTRIXS BLK 2, CND Phase 3, EKMS Phase V, BLOS Tactical Data Exchange, Port DMS to ISNS/Sub LAN, GPS User Equipment Upgrade (NAVSSI, NAVWAR), HAIPE	IPv6, NCES Incr 2 (Common Enterprise Infrastructure, Open Services/Interfaces, Web-Enabled), DCGS/TCS, WNW uses CLIP for Combat interface, COMPOSE 4, CDL Spiral 1, CLIP, JTRS, WNW, Tactical Networking Waveform, SSEE incr F, JICO Support System , Enterprise Management Spiral 2, Content Based Encryption, GPS Modernized User Equipment, ISNS Incr 2	CDS (Content Based INFOSEC), Merged Networks, NCES (Incr 3), IP based combat systems (DDX, CVN 21), Assured IP, Sub-LAN Incr 3, Enterprise Management Spiral 3, SCI Networks incr 3
	Aircraft	Some aircraft with Link 16 MIDS-LVT (LOS Only), Link 11, GPS Receivers	Link 16, Link 16 data integrated into OFP, Link 22, GPS User Equipment Upgrade (NAVWAR)	CLIP, MIDS JTR, WNW (ANW), Tactical Networking Waveform, Stand Alone Display uses IP data (Kneeboard IP capability via WNW pipe), WNW uses CLIP for host interface to OFP, Weapons Data Link, GPS Modernized User Equipment	CDS (Content Based INFOSEC), OFP uses IP based information, Modify OFP to handle IP based traffic
User Centric Information Systems	Ships Subs Shore	Sharing of data via translators, CDF/BGPHES/COBLU	GCCS 4x/JC2 Incr 1 (Web Enabled Devices, User Defined Operational Picture (UDOP)), COMPOSE 2&3, SSEE incr E, CUB (SCI GCCS), METOC Upgrades, NTCSS, Optimized Organizational Maintenance Activity (OOMA), TMIP-M, Navy Enterprise ERP Convergence Effort, CBR Dispersion, JWARN,	IPv6, JC2 Incr 2 (Common Enterprise Infrastructure, Applications Migrate to NCES), CLIP, COMPOSE 4, DCGS/TCS, SSEE incr F, JICO Support System	JC2 Incr 3 (DOD wide use of Services Oriented Architecture), CDS (Content Based INFOSEC)
	Aircraft				JC2 Incr 3 (Modified OFP to handle IP based Information)

Emerging Capabilities

SBIR

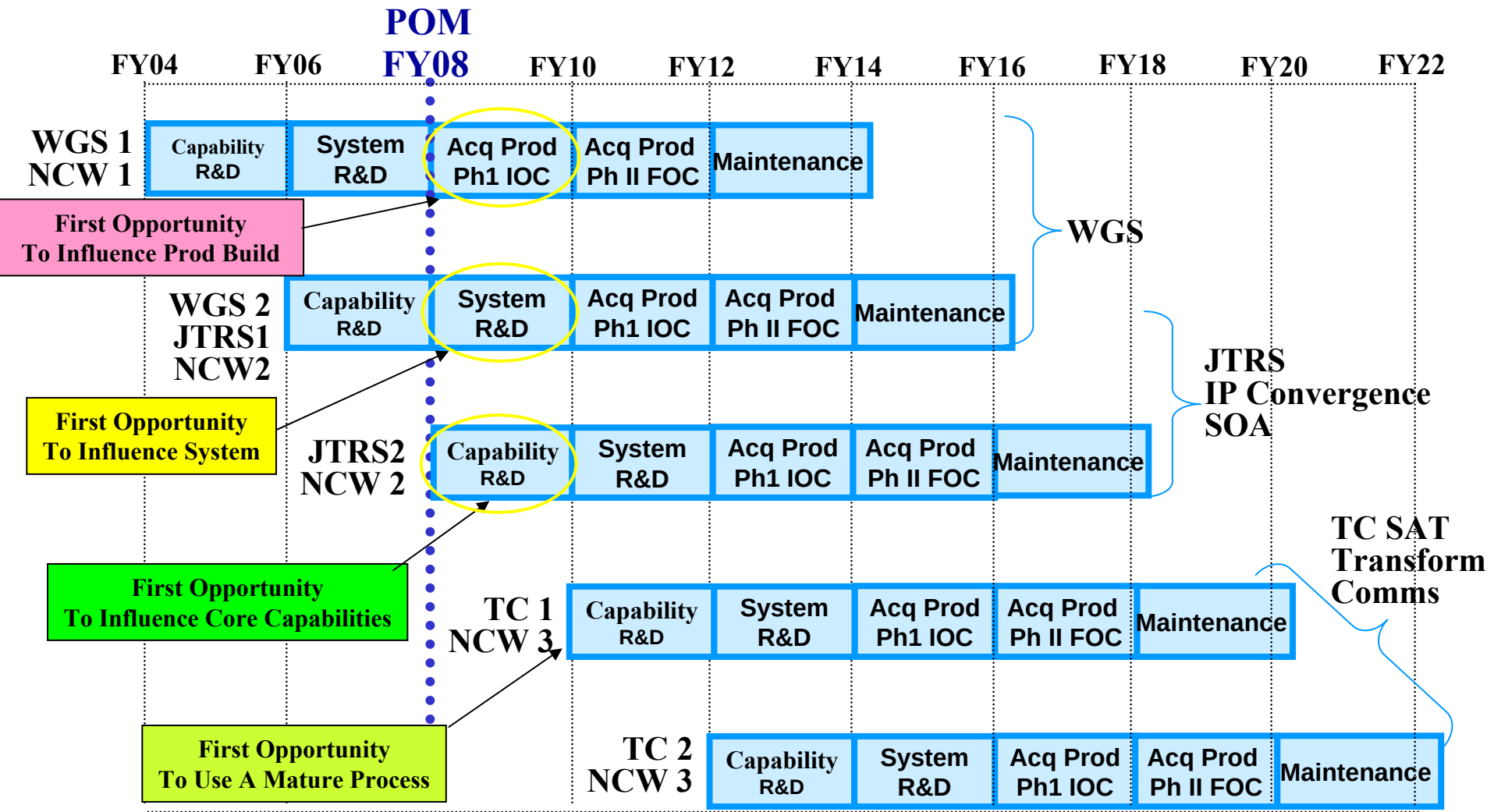


NCW Ready Improvement Opportunities



Challenges

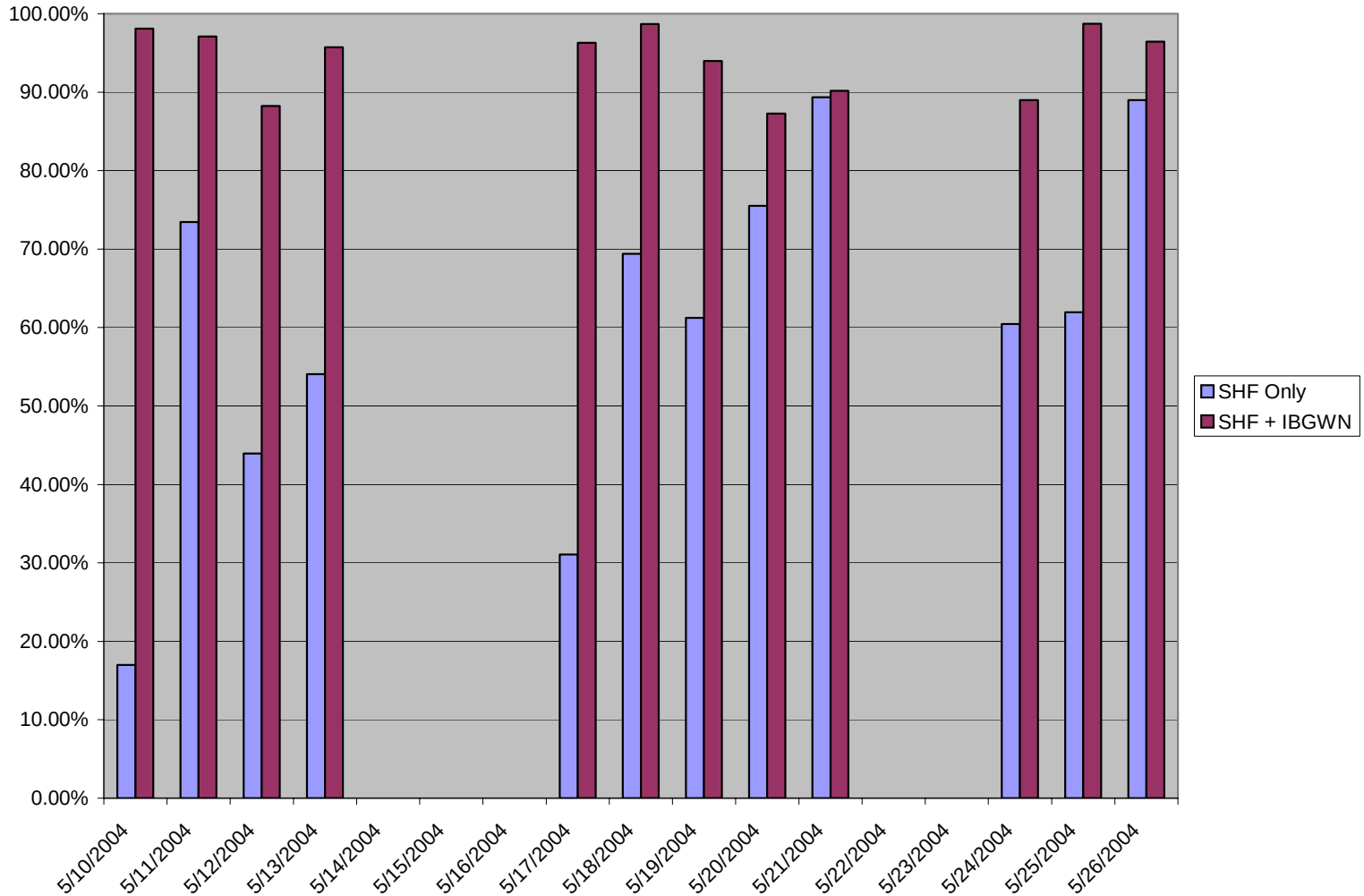
E.G: Transforming the Future Joint/Navy Product Oriented C4ISR Capability into an Integrated C5ISR System



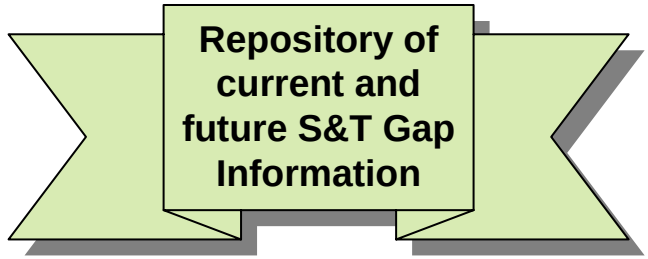
Recent Successes

IBGWN

USS HARPERS FERRY Network Availability during COBRA GOLD 04



PEO C4I Roadmap Analysis Tool



1. Gaps ↔ NCW levels
2. MCP and NCW levels
3. ONR S&T FORCEnet Roadmap
4. Type of program (KSA FNC/RTT/Swampworks, other)
5. Transition POR and Insertion date (production)
6. S&T projects that PEO C4I does not have control of resources
7. Projects that are multi-lateral (multiple PEO/PMW/SYSCOM) in execution and resourcing
8. S&T projects planned but not currently resourced (characteristic planned-S&T program involved)
9. Search/filter through S&T projects by keyword, attribute e.g. NCW, funding, priority, TTA/MOA, etc
10. Schedule of key dates or milestones
11. Etc…

NCW Characteristics Defined

Naval Platform Characteristics

Bandwidth Enabled

- High bandwidth terminals and waveforms
- Dynamic bandwidth management
- Efficient use of all transport resources
- Multi-Path, redundant transport
- IP convergence

Services Oriented Architecture

- Deliver composeable services rather than systems
- Based on commercial standards (XML, UDDI, web-services)
- Services operate independent or loosely coupled
- Facilitates distributed operations
- Enables user customized applications

User Customized Systems

- Work flow driven applications rather than system driven
- Consistent data quality across Planning, Engagement, and ISR Networks
- Information provided to operator is relevant, timely, accurate, and usable
- Cross domain use of data
- Facilitates reduced space, weight, and power


PROGRAM EXECUTIVE OFFICE
C4I & SPACE